<u>CLAIMS</u>

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Having thus described the invention, what is claimed is:

- A coiled carbon nanotube having a non-hexagonal/hexagonal carbon ring ratio
 in the range of 0.1:1 to 1:1.
 - 2. The coiled carbon nanotube of claim 1 wherein the non-hexagonal/hexagonal carbon ring ratio is 0.1:1.
 - 3. The coiled carbon nanotube of claim 1 wherein the non-hexagonal/hexagonal carbon ring ratio is 1:1.
- 10 4. The coiled carbon nanotube of claim 1 wherein the nanotube comprises a substantially uniform distance between coils throughout its length.
 - 5. The coiled carbon nanotube of claim 1 wherein the nanotube comprises a substantially uniform diameter throughout its length.
 - 6. The coiled carbon nanotube of claim 1 wherein the nanotube comprises a substantially uniform distance between coils and diameter throughout its length
 - 7. The coiled carbon nanotube of claim 1 wherein the nanotube comprises a diameter of less than 1000 nm.
 - 8. The coiled carbon nanotube of claim 1 wherein the nanotube comprises a diameter of less than 100 nm.
- 9. The coiled carbon nanotube of claim 1 wherein the nanotube comprises a distance between coils of less than 1000 nm.
 - 10. The coiled carbon nanotube of claim 1 wherein the nanotube comprises a distance between coils of less than 200 nm.

- 11. The coiled carbon nanotube of claim 1 wherein the nanotube comprises a diameter of less than 1000 nm and a distance between coils of less than 1000 nm.
- 12. The coiled carbon nanotube of claim 1 wherein the nanotube comprises a diameter of less than 100 nm and a distance between coils of less than 200 nm.
- 5 13. A coiled carbon nanotube having a substantially uniform diameter throughout its length.
 - 14. The coiled carbon nanotube of claim 13 wherein the nanotube comprises a diameter of less than 1000 nm.
- 15. The coiled carbon nanotube of claim 13 wherein the nanotube comprises a diameter of less than 100 nm.
 - 16. A coiled carbon nanotube wherein the nanotube comprises a substantially uniform distance between coils throughout its length.
 - 17. The coiled carbon nanotube of claim 16 wherein the nanotube comprises a distance between coils of less than 200 nm.
- 15 18. The coiled carbon nanotube of claim 16 wherein the nanotube comprises a distance between coils of less than 1000 nm.
 - 19. A coiled carbon nanotube having a substantially uniform diameter and a substantially uniform distance between coils throughout its length.
- 20. The coiled carbon nanotube of claim 19 wherein the nanotube comprises a diameter of less than 1000 nm and a distance between coils of less than 1000 nm.
 - 21. A method of manufacturing coiled carbon nanotubes, comprising: placing a supported metal catalyst inside of a reaction chamber; creating a microwave field inside said reaction chamber;

introducing a hydrocarbon source gas into said reaction chamber; and reacting for a time and at a temperature sufficient to form said coiled carbon nanotubes.

- 22. The method of claim 21, wherein an inert gas is introduced into said reaction 5 chamber.
 - 23. The method of claim 21, wherein said source gas is acetylene.
 - 24. The method of claim 21, wherein said metal catalyst comprises a metal selected from the group consisting of iron, nickel, cobalt, and vanadium.
- 25. The method of claim 21, wherein said catalyst support is selected from the group consisting of silica, zeolite, and magnesium carbonate.
 - 26. The method of claim 21, wherein said metal catalyst is iron and said catalyst support is magnesium carbonate.
 - 27. The method of claim 21, wherein said metal catalyst is iron and said catalyst support is silica.
- The method of claim 21, wherein said metal catalyst is nickel and said catalyst support is zeolite.
 - 29. The method of claim 21, further comprising the use of a stirrer to make said microwave field uniform.
 - 30. The method of claim 21, further comprising a stub tuner.
- 20 31. The method of claim 30, further comprising a port circulator for controlling said stub tuner.
 - 32. The method of claim 21, further comprising a circulating chiller.
 - 33. A method for manufacturing coiled carbon nanotubes, comprising:

placing a supported metal catalyst inside of a reaction chamber;

creating a microwave field inside said reaction chamber;

introducing a hydrocarbon source gas into said reaction chamber;

using a feedback system to control the temperature inside said reaction

chamber and the flow rate of said hydrocarbon source gas; and

reacting for a time and at a temperature sufficient to form said coiled carbon

nanotubes.

- 34. The method of claim 33, wherein an inert gas is introduced into said reaction chamber.
- The method of claim 33, wherein said source gas is acetylene.
 - 36. The method of claim 33, wherein said metal catalyst comprises a metal selected from the group consisting of iron, nickel, cobalt, and vanadium.
 - 37. The method of claim 33, wherein said catalyst support is selected from the group consisting of silica, zeolite, and magnesium carbonate.
- 15 38. The method of claim 33, wherein said metal catalyst is iron and said catalyst support is magnesium carbonate.
 - 39. The method of claim 33, wherein said metal catalyst is iron and said catalyst support is silica.
- 40. The method of claim 33, wherein said metal catalyst is nickel and said catalyst 20 support is zeolite.
 - 41. The method of claim 33, further comprising the use of a stirrer to make said microwave field uniform.
 - 42. The method of claim 33, further comprising a stub tuner.

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- 43. The method of claim 42, further comprising a port circulator for controlling said stub tuner.
 - 44. The method of claim 33, further comprising a circulating chiller.
 - 45. The method of claim 33, wherein said feedback system comprises:

5 a pyrometer;

a switching power supply;

a computer;

a master flow controller; and

a mass flow controller.

10 46. A coiled carbon nanotube produced by the process of:

placing a supported metal catalyst inside of a reaction chamber;

creating a microwave field inside said reaction chamber;

introducing a hydrocarbon source gas into said reaction chamber; and

reacting for a time and at a temperature sufficient to form said coiled carbon

nanotubes.

- 47. The coiled carbon nanotube of claim 46, wherein argon is introduced into said reaction chamber.
 - 48. The coiled carbon nanotube of claim 46, wherein said source gas is acetylene.
- 49. The coiled carbon nanotube of claim 46, wherein said metal catalyst comprises a metal selected from the group consisting of iron, nickel, cobalt, and vanadium.
 - 50. The coiled carbon nanotube of claim 46, wherein said catalyst support is selected from the group consisting of silica, zeolite, and magnesium carbonate.

- 51. The coiled carbon nanotube of claim 46, wherein said metal catalyst is iron and said catalyst support magnesium carbonate.
- 52. The coiled carbon nanotube of claim 46, wherein said metal catalyst is iron and said catalyst support is silica.
- 5 53. The coiled carbon nanotube of claim 46, wherein said metal catalyst is nickel and said catalyst support is zeolite.
 - 54. The coiled carbon nanotube of claim 46, further comprising the use of a stirrer to make said microwave field uniform.
 - 55. The coiled carbon nanotube of claim 46, further comprising a stub tuner.
- The coiled carbon nanotube of claim 55, further comprising a port circulator for controling said stub tuner.
 - 57. The coiled carbon nanotube of claim 46, further comprising a circulating chiller.
 - 58. The coiled carbon nanotube of claim 46, further comprising the use of a feedback system to control the temperature inside said reaction chamber and the flow rate of said hydrocarbon source gas.
 - 59. A coiled carbon nanotube produced by the process of claim 58, wherein said feedback system comprises:

a pyrometer;

20 a switching power supply;

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a computer;

a master flow controller; and

a mass flow controller.

- 60. An article of manufacture produced by the process of:

 placing a supported metal catalyst inside of a reaction chamber;

 creating a microwave field inside said reaction chamber;

 introducing a hydrocarbon source gas into said reaction chamber; and

 reacting for a time and at a temperature sufficient to form said coiled carbon nanotubes.
 - 61. The article of manufacture of claim 60, wherein argon is introduced into said reaction chamber.
 - 62. The article of manufacture of claim 60, wherein said source gas is acetylene.
- 10 63. The article of manufacture of claim 60, wherein said metal catalyst comprises a metal selected from the group consisting of iron, nickel, cobalt, and vanadium.
 - 64. The article of manufacture of claim 60, wherein said catalyst support is selected from the group consisting of silica, zeolite, and magnesium carbonate.
 - 65. The article of manufacture of claim 60, wherein said metal catalyst is iron and said catalyst support is magnesium carbonate.
 - 66. The article of manufacture of claim 60, wherein said metal catalyst is iron and said catalyst support is silica.
 - 67. The article of manufacture of claim 60, wherein said metal catalyst is nickel and said catalyst support is zeolite.
- 20 68. The article of manufacture of claim 60, further comprising the use of a stirrer to make said microwave field uniform.
 - 69. The article of manufacture of claim 60, further comprising a stub tuner.

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- 70. The article of manufacture of claim 69, further comprising a port circulator for controlling said stub tuner.
- 71. The article of manufacture of claim 60, further comprising a circulating chiller.
- The article of manufacture of claim 60, further comprising the use of a feedback system for controling the temperature inside said reaction chamber and the flow rate of said hydrocarbon source gas.
 - 73. The article of manufacture of claim 72, wherein said feedback system comprises:

a pyrometer;

a switching power supply;

a computer;

a master flow controller; and

a mass flow controller.

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